

REMARKS

Claims 1, 4, 7, 10, 11, 12, and 15 are pending in the present application. Before addressing the particulars of the claim rejections, Applicants note the following features of embodiments of their invention with respect to, for example, Figures 1b through Figure 4. Consider the prior art "second surface disk" illustrated in Figure 1a. As pointed out by the Applicants on page 11 and also in the background section of the application, the information layers in such conventional optical disks are covered by a relatively thick polycarbonate substrate or cover sheet. For example, such a cover sheet is included on CD-ROMs for personal computers. As stated by the Applicants on page 3, line 27, the "relatively thick and transparent substrate of second-surface optical disks makes read-only or read/write operations relatively insensitive to dust particles, scratches, and the like since they can be located approximately a thousand wavelengths or more from the information layer." This may be seen in Figure 1a, where the information layer formed by grooves 108 and lands 110 is covered by layer 102. This layer is optically quite thick so that imperfections on surface 104 are defocused with respect to the underlying information layer. Because of this defocusing effect, you can freely handle CD-ROMS, placing all manner of fingerprints and dust on their surface, yet they work quite readily. The present assignee of this application has developed "first surface" optical disks that have no such defocusing layer. This may be seen with respect to Figure 1b, where the laser beam impinges on the information layer 104 without passing through any defocusing/relatively thick substrate layer. In this inventive first surface disk, a ROM portion (element 202 in Figure 2) and a RAM portion 204 are formed by the covering of a stamped substrate with a continuous phase-change layer.

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It may immediately be seen that this is strikingly different from prior art disks. Typically, ROM disks such as a CD-ROM are covered with a reflective layer such as aluminum. This reflective layer covers features stamped into a substrate layer. Then another substrate layer overlays the reflective layer to form a second surface disk. In contrast, phase-change layers are used in the prior art to form writeable optical disks. Whereas the goal in a ROM disk where the features are read by reflection, writeability requires absorption, not reflective properties. Thus, prior art disks having ROM and RAM portions were clumsy affairs, needing lots of masking steps to form the reflective ROM portion vs. the absorbing RAM portion.

In sharp contrast, Applicants provide a first surface optical disks wherein a single phase change layer covers a stamped (in one embodiment) substrate. They were able to do so by choosing a phase change layer which had just the right amount of reflectivity and absorptivity so that it could form both ROM and RAM portions. Through this dramatic innovation, the manufacture became vastly cheaper and easier. At the same time, because no defocusing layer is used, optical aberrations and other distortions are removed, such that the feature size may be shrunk accordingly. To provide better optical coupling to the phase change layer, a sputtered dielectric layer may cover the phase change layer as described, for example, on page 16, line 29. Unlike a second surface disk, this optical coupling layer, being just sputtered on, is far too thin to provide a defocusing effect. Thus, although Applicants' disk cannot be handled like a CD-ROM (with no defocusing layer, the fingerprints would be problematic), it has none of the optical aberrations which plague conventional second surface disks. As seen in Figures 3 and 4, no additional layers cover the information layer. Thus, the features are not "filled in" as they would be in a second surface disk as seen in Figure 1a.

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As described by the Applicants starting on page 22, the ROM section is formed using bumps whereas the RAM section does not include these bumps. Applicants have discovered that by limiting the data density in the ROM section to be less than the density employed in the RAM section, data jitter and other error caused by the failure of substrate resin to completely fill the bumps is reduced. This inventive discovery is reflected in claim 1, which recites "bumps formed on a first portion of the first principal surface, wherein the bumps represent pre-recorded information; lands formed on a second portion of the first principal surface; and a phase-change material deposited on the first portion and the second portion of the first principal surface; and a dielectric layer sputtered over the phase-change material; the first-surface disk having no additional layers overlaying the dielectric layer, wherein a data density of the first portion is less than a data density of the second portion."

The prior art stands in sharp contrast to such an inventive combination. Specifically, none of the prior art in any way discloses or teaches the ROM/RAM (recited as first portion and second portion, respectively) combination formed by a phase-change material as claimed. Moreover, none of the prior art teaches the sputtered dielectric layer (which as set forth in the application merely acts as an optical coupling layer rather than a defocusing layer) overlaying the ROM/RAM portions, with no additional defocusing layer as described above with respect to second surface disks. Accordingly, claim 1 is patentable over the cited prior art. Because claims 4, 7, 10, 11, 12, and 15 depend either directly or indirectly upon claim 1, they are patentable over the cited prior art for at least the same reasons.

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Applicants note that the 112 issues noted in the office action have been addressed. In that regard, as can be seen by the amendments to claim 1, the invention is considerably broader than whether information is written to lands or grooves.

CONCLUSION

For the foregoing reasons, Applicant believes pending Claims 1, 4, 7, 10, 11, 12, and 15 are allowable, and a notice of allowance is respectfully requested. If the Examiner has any questions regarding the application, the Examiner is invited to call the undersigned Attorney at (949) 752-7040.

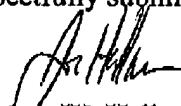
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Linda Bolter

November 4, 2004
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